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# Ryan J. Hubbard

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Beckman Institute for Advanced Science and Technology  
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## EDUCATION

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### *University of Illinois at Urbana-Champaign*

- 2014 – 2017      **Ph.D. Psychology (Cognitive Neuroscience)**  
Minors: Quantitative Psychology, Signal Processing  
Advisor: Kara Federmeier, Ph.D.  
Thesis: “Precursors and Downstream Consequences of Prediction in Language Comprehension”
- 2011 – 2014      **M.A. Psychology (Cognitive Neuroscience)**  
Advisor: Brian Gonsalves, Ph.D.  
Thesis: “Unitization and semantic information”

### *University of California, Davis*

- 2006 – 2010      **B.S. Psychology (Biological Emphasis)**  
Magna Cum Laude with Departmental Distinction and Honors  
Minor: Neuroscience

## RESEARCH POSITIONS

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### *University of Illinois at Urbana-Champaign*

- 2021 – present      **Postdoctoral Research Associate**  
PI: Kara Federmeier
- 2018 – 2021      **Beckman Institute Postdoctoral Fellow**  
PIs: Kara Federmeier, Lili Sahakyan, Aaron Benjamin
- 2013 – 2017      **Graduate Researcher**  
Cognition and Brain Lab (PI Kara Federmeier)
- 2011 – 2013      **Graduate Researcher**  
Cognitive Neuroscience of Memory Lab (PI Brian Gonsalves)

### *HRL Laboratories*

- 2017 – 2018      **Postdoctoral Research Scientist**  
Information and System Sciences Lab

### *Thomas J. Watson Research Center, IBM Research*

- May – Aug 2016      **Research Intern**  
Education and Cognitive Sciences (PI Aldis Sipolins)

## ***University of California, Davis***

- 2010 – 2011      **Junior Specialist**  
Center for Mind and Brain (PIs Clifford Saron & Yukari Takarae)
- 2009 – 2010      **Research Assistant**  
Center for Neuroscience (PI Leah Krubitzer)
- 2009 – 2010      **Research Assistant**  
Human Memory Lab (PI Andrew P. Yonelinas)
- 2008 – 2010      **Research Assistant**  
UCD M.I.N.D. Institute, CABIL Lab (PI Tony J. Simon)

## **SPECIALIZED TRAINING**

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- May 2022      **Leading Edge Workshop on Co-Registration**  
Methods workshop on co-registering eyetracking and EEG collection
- September 2018      **EEG Frequency-Tagging Workshop (PI Bruno Rossion)**  
Best practices for running a frequency tagging study and analyzing data
- September 2016      **Time-Frequency Analysis Workshop (PI Mike X. Cohen)**  
Methods and best practices for time-frequency analyses on EEG data
- August 2012      **fMRI Training Course (PI John Jonides)**  
Statistics, physics, and methods of fMRI data collection and analysis
- July 2010      **ERP Boot Camp (PI Steve Luck)**  
Basic principles of EEG, filtering, averaging, baseline, source localizing

## **AWARDS**

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- 2020      NIA R01: Spontaneous Speech and Health Disparities in Risk of Cognitive Decline: WHICAP Offspring Ancillary Study (role: consultant)
- 2018      Beckman Postdoctoral Fellowship Award
- 2018      HRL CRAD / ELM Achievement Award
- 2016      Cognitive Neuroscience Divisional Fellowship
- 2015      Named on List of Teachers Ranked as Excellent
- 2014      UIUC Cognitive Science / Artificial Intelligence Award
- 2011 – 2013      IGERT NeuroEngineering Fellowship

## **PUBLICATIONS & PEER-REVIEWED PROCEEDINGS**

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**Hubbard, R. J., & Sahakyan, L.** (under review). Differential recruitment of inhibitory control processes by directed forgetting and thought substitution. *Journal of Neuroscience*.

**Hubbard, R.J., Bulkes, N.Z., & Lai, V.T.** (under review). The roles of literality, predictability, and decomposability in compositional processing during idiom comprehension. *Psychophysiology*.

Whitlock, J.S., **Hubbard, R.J.**, Ding, H., & Sahakyan, L. (under review). Trial-level fluctuations in pupil dilation during encoding reflect strength of relational binding. *Journal of Experimental Psychology: Learning, Memory, & Cognition*.

Jacobs, C., **Hubbard, R. J.**, & Federmeier, K. D. (2022). Masked language models directly encode linguistic uncertainty. *Proceedings of the Society for Computation in Linguistics*, 5(1), 225-228.

**Hubbard, R. J.**, & Sahakyan, L. (2021). Separable neural mechanisms support intentional forgetting and thought substitution. *Cortex*, 142, 317-331.

**Hubbard, R. J.**, Zadeh, I., Jones, A.P., Robert, B., Bryant, N.B., Clark, V.P., & Pilly, P.K. (2021). Brain connectivity alterations during sleep by closed-loop transcranial neurostimulation predict meta-memory sensitivity. *Network Neuroscience*, 5(3), 734-756.

**Hubbard, R. J.**, & Federmeier, K.D. (2021). Dividing attention influences contextual facilitation and revision during language comprehension. *Brain Research*, 1764, 147466.

**Hubbard, R. J.**, & Federmeier, K.D. (2021). Representational pattern similarity of electrical brain activity reveals rapid and specific prediction during language comprehension. *Cerebral Cortex*, 31(9), 4300-4313.

Lai, V. T., **Hubbard, R.J.**, Ku, L., & Pfeifer, V. (accepted). Electrophysiology of non-literal language. In *Language Electrified: Techniques, Methods, Applications, and Future Perspectives in the Neurophysiological Investigation of Language*. Edited by Grimaldi, M., Shtyrov, Y., Brattico, E. Springer.

Pilly, P. K., Skorheim, S. W., **Hubbard, R. J.**, Ketz, N. A., Roach, S. M., Lerner, I., ... & Mullins, T. S. (2020). One-shot tagging during wake and cueing during sleep with spatiotemporal patterns of transcranial electrical stimulation can boost long-term metamemory of individual episodes in humans. *Frontiers in Neuroscience*, 13, 1416.

Lucas, H.D., Gupta, R.S., **Hubbard, R.J.**, & Federmeier, K.D. (2019). Adult age differences in the use of conceptual combination as an associative encoding strategy. *Frontiers in Human Neuroscience*, 13, 339.

**Hubbard, R. J.**, Rommers, J., Jacobs, C. L., & Federmeier, K. D. (2019). Downstream behavioral and electrophysiological consequences of word prediction on recognition memory. *Frontiers in Human Neuroscience*, 13, 291.

**Hubbard, R.J.**, Sipolins, A., & Zhou, L. (2017). Enhancing Learning Through Virtual Reality and Neurofeedback: A First Step. *Proceedings of the 7<sup>th</sup> International Learning Analytics & Knowledge Conference*, Vancouver, BC, Canada.

Lucas, H.D., **Hubbard, R.J.**, & Federmeier, K.D. (2017). Flexible conceptual combination: Electrophysiological correlates and consequences for associative memory. *Psychophysiology*, 54(6), 833-847.

Sturgeon, B.A., **Hubbard, R.J.**, Schmidt, S.A., & Loucks, T. (2015). High F0 and musicianship make a difference: Pitch-shift responses across the vocal range. *Journal of Phonetics*, 51, 70-81.

## PATENTS

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Ryan J. Hubbard & Praveen K. Pilly (2019). Method and system for improving quality of life for the elderly through neurostimulation. *US11285319B1*.

Payel Das & Ryan J. Hubbard (2017). Adaptive Filtration of Sweat Artifacts During Electronic Brain Monitoring. *US20190008383A1*.

## PRESENTATIONS

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Whitlock, J.S., Lo, Y., Ding, H., **Hubbard, R.J.**, & Sahakyan, L. (2022). First Gaze Assessment of the Selective Rehearsal Account of Item-Method DF. Poster to be presented at *The 63rd Annual Meeting of the Psychonomic Society*, Boston, MA.

**Hubbard, R.J.**, & Federmeier, K.D. (2022). Replacing high-pass filters with Blink-Identified Robust Detrending: Put a BIRD on it! Poster to be presented at *The 62nd Annual Meeting of the Society for Psychophysiological Research*, Vancouver.

**Hubbard, R.J.**, & Federmeier, K.D. (2022). Investigating Electrophysiological Correlates of Prediction Updating in a Two-Day Reading Study. Poster to be presented at *The 62nd Annual Meeting of the Society for Psychophysiological Research*, Vancouver.

**Hubbard, R.J.**, & Sahakyan, L. (2022). Direct suppression, but not thought substitution, recruits top-down inhibitory control mechanisms. Poster presented at *The 29th Annual Meeting of the Cognitive Neuroscience Society*, San Francisco, CA.

Whitlock, J.S., Sahakyan, L., & **Hubbard, R.J.** (2022). Pupil-size fluctuations during learning predict relational binding. Poster presented at *The 94th Annual Meeting of the Midwestern Psychological Association*, Chicago, IL.

**Hubbard, R.J.** & Sahakyan, L. (2020). ERP and representational similarity analyses reveal the temporal dynamics of intentional forgetting and thought substitution. Poster presented at *The 16th Annual Meeting of the Context and Episodic Memory Symposium*, Virtual Meeting.

**Hubbard, R.J.**, Jiang, L., & Sahakyan, L. (2020). ERP and Oscillatory Dynamics Differentiate Forget and Thought Substitution Cues in Intentional Forgetting. Poster presented at *The 27th Annual Meeting of the Cognitive Neuroscience Society*, Virtual Meeting.

**Hubbard, R.J.** & Federmeier, K.D. (2019). Early Neural Signals of Prediction During Language Comprehension Are Modulated by Constraint and Expectancy. Poster presented at *The 11th Annual Meeting of the Society for the Neurobiology of Language*, Helsinki, FI.

**Hubbard, R.J.** & Federmeier, K.D. (2019). Dividing Attention During Language Comprehension Affects ERP Components of Contextual Integration and Revision. Poster presented at *The 11th Annual Meeting of the Society for the Neurobiology of Language*, Helsinki, FI.

**Hubbard, R.J.**, Ketz, N.A., Jones, A.P., Robert, B., Bryant, N.B., Skorheim, S.W., Roach, S., Clark, V.P., & Pilly, P.K. (2018). Memory reactivation with neurostimulation during sleep elicits electrophysiological responses that predict behavioral changes. Poster presented at *The 25th Annual Meeting of the Cognitive Neuroscience Society*, Boston, MA.

**Hubbard, R.J.** & Federmeier, K.D. (2017). Precursors and Processes of Prediction: A Word-Stem Completion ERP Study. Poster presented at *The 24th Annual Meeting of the Cognitive Neuroscience Society*, San Francisco, CA.

Norton, J.J.S., **Hubbard, R.J.**, Smith, C., & Bretl, T. (2017). Classification of neural responses to contextually constrained sentence endings using single trial EEG data. Poster presented at *The 24th Annual Meeting of the Cognitive Neuroscience Society*, San Francisco, CA.

**Hubbard, R.J.** & Federmeier, K.D. (2016). An Electrophysiological Investigation of the Effects of Expectedness, Sentential Constraint, and Plausibility on Memory for Words. Poster presented at *The 56th Annual Meeting of the Society for Psychophysiological Research*, Minneapolis, MN. **(Student Poster Award Winner)**

Leckey, M., **Hubbard, R.J.**, & Federmeier, K.D. (2016). Probability, semantics, syntax, memory: Within subject comparisons of late positive components. Poster presented at *The 8th Annual Meeting of the Society for the Neurobiology of Language*, London, England.

**Hubbard, R.J.** & Federmeier, K.D. (2016). Encoding the Context: Effects of Sentential Context and Predictability on Recognition Memory. Poster presented at *The 12th Annual Meeting of the Context and Episodic Memory Symposium*, Philadelphia, PA.

Lucas, H.D., Gupta, R.S., **Hubbard, R.J.**, & Federmeier, K.D. (2016). An ERP study of adult age differences in the use of self-directed conceptual combination to construct unitized memory representations. Poster presented at *The 23rd Annual Meeting of the Cognitive Neuroscience Society*, New York, NY.

Rommers, J., **Hubbard, R.J.**, Federmeier, K.D. (2016). Effects of sentential constraint and expectancy on subsequent memory in older adults. Poster presented at *The 23rd Annual Meeting of the Cognitive Neuroscience Society*, New York, NY.

**Hubbard, R.J.** & Federmeier, K.D. (2015). Predictors and Characteristics of Word Stem Completion. Poster presented at *The 56th Annual Meeting of the Psychonomic Society*, Chicago, IL.

**Hubbard, R.J.**, Rommers, J., Jacobs, C.L., & Federmeier, K.D. (2015). Electrophysiological Predictors of Successful Memory During Encoding of Sentential Information Vary Based on Constraint and Predictability. Poster presented at *The 7th Annual Meeting of the Society for the Neurobiology of Language*, Chicago, IL.

**Hubbard, R.J.**, Rommers, J., Jacobs, C.L., & Federmeier, K.D. (2015). Effects of Expectedness and Sentential Constraint on Memory for Words: Behavioral and Electrophysiological Evidence. Poster presented at *The 55th Annual Meeting of the Society for Psychophysiological Research*, Seattle, WA.

Lucas, H. D., **Hubbard, R.J.**, Abusager, K., and Federmeier, K. D. (2014). An ERP investigation of the formation of unitized memory representations of arbitrary word pairs. Poster presented at *The 44th Annual Meeting of the Society for Neuroscience*, Washington, DC.

**Hubbard, R.J.** & Gonsalves, B. (2014). Unitization of Pseudowords: An ERP Investigation of the Role of Semantic Information. Poster presented at *The 21st Annual Meeting of the Cognitive Neuroscience Society*, Boston, MA.

**Hubbard, R.J.** & Gonsalves, B. (2013). An ERP Investigation of Unitization of Abstract Visual Stimuli: The Role of Conceptual Information. Poster presented at *The 20th Annual Meeting of the Cognitive Neuroscience Society*, San Francisco, CA.

**Hubbard, R.J.** (2010). Recollection and Familiarity in Chromosome 22q11.2 Deletion Syndrome. Presented at the *21st Annual Undergraduate Research, Scholarship and Creative Activities Conference*, UC Davis.

## **TEACHING EXPERIENCE**

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### ***University of Illinois at Urbana-Champaign***

- Spring 2016 – 2017*    **Psychology 499: “Psychology Honors Seminar”**  
Teaching assistant for 3-semester long honors course. Assisted students in developing experimental materials and edited writing samples. Gave statistical and career advice.
- 2013 - 2016*            **EEG Discussion Group**  
Organizer and discussion leader. Every semester, lead a discussion group on advanced EEG methods, such as time-frequency analysis, rERPs, MEMs, and classification.
- Summer 2015*        **Psychology 204: “Intro to Brain & Cognition”**  
Instructor. Developed curriculum, lectures, daily quizzes, and exams. Delivered lectures on important and innovative findings of cognitive neuroscience, and on methods to critically analyze neuroscientific studies.
- Spring 2014*         **Psychology 204. “Intro to Brain & Cognition”**  
Teaching assistant. Developed lectures, held office hours and review sessions, delivered guest lectures, and assisted students.

## **AD HOC JOURNAL REVIEWING**

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*Behavioral Brain Research*  
*Journal of Cognitive Neuroscience*  
*Language, Cognition, and Neuroscience*  
*Laterality*  
*Psychonomic Bulletin and Review*  
*Psychophysiology*

## **PROFESSIONAL AFFILIATIONS**

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*Cognitive Neuroscience Society*  
*Psychonomic Society*  
*Society for Learning Analytics Research*  
*Society for the Neurobiology of Language*  
*Society for Neuroscience*  
*Society for Psychophysiological Research*